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I, LEANNE MYNOTT, MANAGER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003907213 for a patent by CAMPBELL ROSS MCKINLAY, JULIAN MACKINLAY KING and MURRAY CHRISTIAN PICKFORD as filed on 31 December 2003.

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WITNESS my hand this
Tenth day of September 2004

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Improvements in Insulated Glass Door Structures

BACKGROUND

The present invention relates to improvements in insulated glass door and window structures and more particularly relates to an apparatus and method for eliminating or reducing condensation on the external face of such glass door/window structures. More particularly the present invention relates to improvements in the structure of insulated glass door/window structures such as are used in connection with insulated glazed windows and refrigeration, and particularly in industrial and commercial refrigeration. The invention also relates to improvements in the economics of manufacture of insulated glass doors and windows. Although the invention will primarily be described with reference to its application in glass doors and particularly double glazed doors used in such applications as refrigeration it will be appreciated by persons skilled in the art that the invention has applications in other areas such as in windows and any structure which utilizes glass and particularly though not exclusively double glazing .

PRIOR ART

In industrial and commercial refrigeration, and particularly refrigeration cabinets employed at points of sale and in a variety of establishments, double and/or triple glass doors are used to insulate the refrigerated contents.

In some glass door structures, for example those in refrigerators, freezers, and the like, where a temperature differing substantially from that of the surrounding atmosphere is to be maintained within a storage compartment, an electrical current and metallic film is employed heating the outer glass pane in an effort to eliminate condensation and provide clear visibility to the goods contained.

Such conventional glass doors demand not only electrical heating themselves but, due to heat transfer, require additional energy in order to maintain internal refrigeration.

In addition, conventional insulated glass doors comprise parallel panes of glass affixed with spacer bars to form one complete glass unit. This glass pane assembly is then

enclosed within a metal or composite structural doorframe in order to complete the construction of the insulated glass door.

There has been a long felt want in the industry to provide a more efficient an economic means to prevent condensation in or on a fridge/freezer door and particularly on those doors having double/triple glazing.

INVENTION

The present invention provides improvements in the structure of insulated glass door structures such as are used in connection with refrigeration and particularly in industrial and commercial refrigeration wherein means are provided to reduce or eliminate condensation on glass surfaces. Glass surfaces of such fridge/freezer doors are required to remain clear so that the contents of the fridge/freezer may be inspected by a consumer.

It will be appreciated by persons skilled the art that while this invention to be described herein is open to various variations and modifications, the illustrated embodiments set out herein are non-limiting. It should therefore be understood that the embodiments of the drawing are merely an example of one implementation of the invention. There are a variety of embodiments and alternative constructions and equivalents falling within the scope of the invention.

It is one object of the invention to provide means that eliminates condensation on glass doors of a refrigerator but without the need for electrical heating of glass surfaces included in the doors.

It is another object of the invention to provide means that reduce/eliminate condensation on glass doors of a refrigerator/freezer and which substantially reduces operating and manufacturing costs.

It is another object of the invention to provide mechanical means that reduce/eliminate condensation on glass doors of a refrigerator/freezer and obviates the need for electrical heating of glass surfaces included in the doors.

It is a further object of the invention to provide an alternative means for insulation of double glazed structures such as but not limited to windows and doors and to prevent unwanted condensation on such structures.

It is a further object of the invention to provide mechanical means that reduce/eliminate condensation on glass doors of a refrigerator/freezer but without the costs and maintenance associated with the electrical heating of glass surfaces of fridge/freezer doors.

The present invention seeks to provide a novel alternative to the known methods of reducing/eliminating condensation on glass refrigerator/freezer doors without the need for electrical heating elements.

The present invention also seeks to provide a novel alternative to the known methods of insulating and manufacturing double/triple-glazed windows.

In a broad form of the method aspect the present invention comprises:
a door for the use in insulating contents of a cooling cupboard, fridge, freezer, or the like, the door comprising a frame,
a first skin anchored to the frame,
a second skin anchored to the frame and opposing the first skin such that said first and second skins define an internal space there between; and
the door further comprising in said internal space a planar member which insulates said first and or second skin.
In another broad form the present invention comprises:
a double glazed insulated fridge/freezer door having inner and outer glass panels which together define in internal space wherein the internal space includes a planar panel which

insulates one or both said glass panels thereby reducing/eliminating condensation on the said glass panels.

In another broad form the present invention comprises:

a double glazed insulated fridge/freezer including at least one door having inner and outer glass panels which together define in internal space; wherein the internal space includes a planar panel which insulates one or both said glass panels; thereby reducing/eliminating condensation on the said glass panels.

According to a preferred embodiment the first and second skins comprise glass panes that define a/the said internal space. The planar insulating member is preferably a thermal plastics material mounted midway between the glass panes.

The skins are transparent and may be glass perspex or the like. According to one embodiment, plastic extrusions may be used to provide the door/window-frame that also acts as glass panel spacers and mounts.

In another broad form the present invention comprises:

a double glazed door or window including at least one internal planar member which inhibits or prevents condensation on a surface of the glass.

In another broad form of a method aspect, the present invention comprises a method for constructing a fridge door including means to prevent condensation on glass surfaces of the door/window the method comprising the steps of:

a) providing a door frame which receives a first skin anchored to the frame,

b) attaching a planar member to said frame;

c) attaching a second skin anchored to the frame such that it opposes the first skin and so said first and second skins define an internal space housing the planar insulating member.

The method comprises the further step of placing the planar insulating member at a spacing equidistant from the first and second skins.

Preferably, a completed insulated glass door/window includes: a door-frame; at least two glass and/or plastic panes fixed with cement to the frame; sealant; moisture absorption granules; argon gas; and a gasket.

Preferably the glass or plastics panes are supported by a plastic extrusion forming both the door-frame and pane mounts. The extruded plastic is preferably cut and welded to suite each door or window unit. Glass panels are preferably mounted on mounting surfaces of the extrusion and a clear rigid thermal plastic pane is mounted midway between the glass panes. Preferably a rigid adhesive is used for attachment of the panes to the mounting surfaces.

Preferably the glass and plastic panes are spaced to provide optimum insulation with argon gas or air-filled cavities injected via latex valves located in the horizontal door-frame members. Desicant chambers may be formed in the plastic extrusion and are filled with desicant moisture absorption granules and sealed using plastic caps prior to welding. Throughout the specification, a reference to door may be taken as a reference to a window as the context allows and a reference to a window may be taken to include door as the context allows.

DETAILED DESCRIPTION

The present invention will now be described in more detail according to preferred but non-limiting embodiment and with reference to the accompanying illustrations wherein:

Figure 1 shows a front view of a typical door assembly according to one embodiment.

Figures 2a and 2b are cross sectional diagrams of possible plastic extrusions which act both as a door-frame as well as spacers for glass and plastic pane spacers and mounts.

Figure 3 is a cross sectional diagram of a completed insulated glass door with door-frame according to one embodiment.

Preferably a plastics extrusion is provided (see Fig 2a and 2b) forming both a door/window frame and pane mount and spacing assembly. The extruded plastic is cut and welded to suit the refrigeration unit. Glass panels (see Fig 3, 1 and 3) are mounted on the mounting surfaces 4 and 6 while a clear rigid thermal plastics pane 2 is mounted midway between glass panes 1 and 3 on surfce 5. Glass and plastic panes 1, 2 and 3 are attached to mounting surfaces using a rigid adhesive. Glass and plastic panes are spaced to provide optimum insulation with argon gas or air-filled cavities 7 inserted via latex valves located in the horizontal door-frame members 8. Desicant chambers 9 and 10 formed in the plastics extrusion are filled with desicant moisture absorption granules in the vertical frame sections and sealed using plastic caps 11 prior to welding. A magnetised flexible gasket 12 is inserted into the gasket retaining groove 13 providing an airtight seal between the insulated glass door and the door fascia of the refrigerator/freezer unit 18.

Additional features in the plastic extrusion include a hinge and torsion bar mounting point 14, screw boss for a door/window hold-open anchoring device 15, a screw boss for door/window handle mounting 16, and excess rigid adhesive traps 17.

From the foregoing, it can be seen that the insulated door/window assembly of the present invention has a modern substantially all glass front appearance but increasing the efficiency and strength of conventional insulated doors and windows to which the industry has been accustomed. Since the door/window assembly requires fewer components such that it comprises a single unit, structural instability causing sag is eliminated, manufacturing costs are greatly reduced, and operational costs are substantially lowered with the removal of electrical heating.

It will be recognized by persons skilled in the art that numerous variations and modifications may be made to the invention as broadly described herein without departing from the spirit and scope of the invention.

Dated this 31st day of December 2003

Campbell Ross Mc Kinlay
Julian McKinlay King
Murray Pickford

By their Patent Attorneys
WALSH & ASSOCIATES

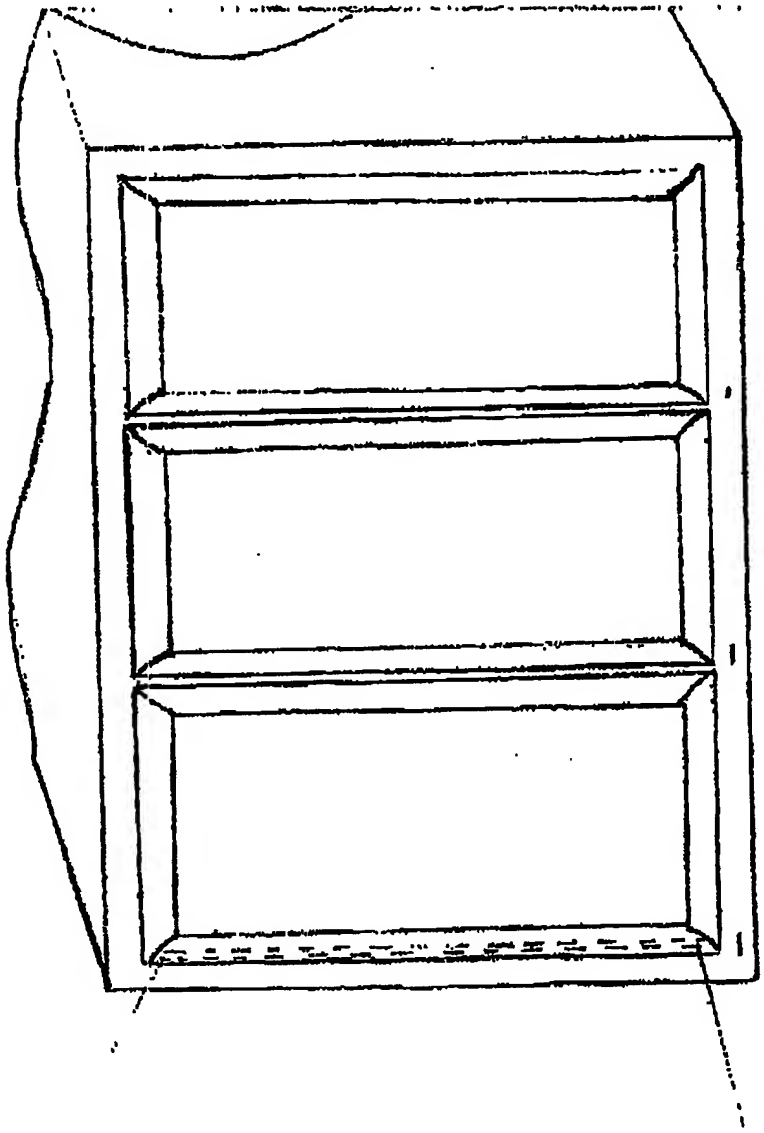

FIG 1

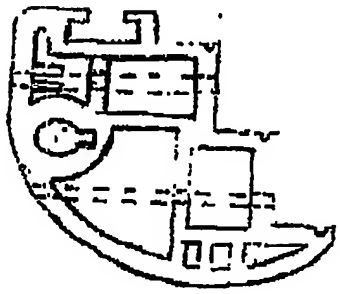

FIG 2A

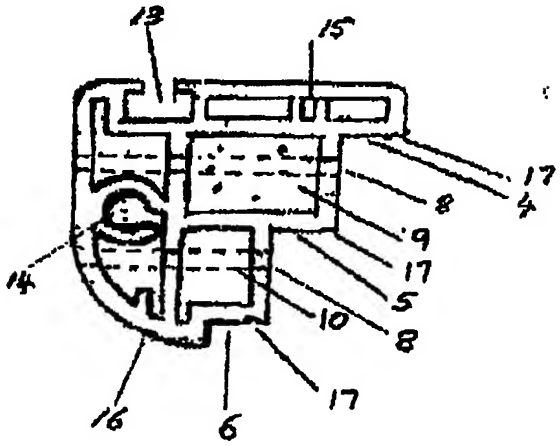

FIG 2B

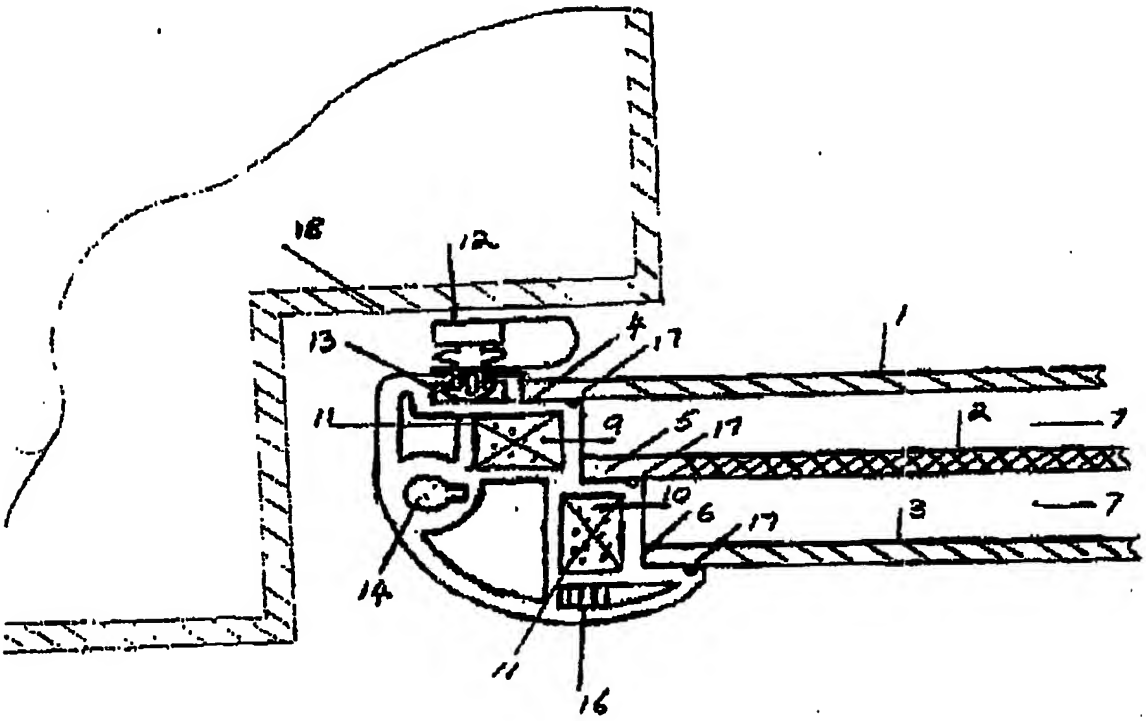

FIG 3